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The Tone-Accents of two Chinese Dialects.—By CORNELIUS BEACH BRADLEY, University of California, Berkeley, California.

A—Cantonese.

The Cantonese words whose "tones" are analyzed on Chart A were spoken by Mr. Sun Yap Shang, of Oakland, a well-known teacher of that dialect. Each word was a typical example of one of the "tones" of the traditional list. The records were made by the Rousselot apparatus. Of each record the wave-lengths (representing the time of each vibration) were carefully measured and plotted, forming the curves or patterns of pitch shown on the chart.[1] Each curve is there identified both by the number—in arabic numerals—and by the name assigned to that particular "tone" in the native list. The hair-line curves shown in the chart are plotted from duplicate records taken for control of results. In all these cases the correspondence between duplicate and original turned out to be so surprisingly close as to give assurance both as to the general accuracy of the method and as to consistency of utterance on the part of the speaker.

From the first it seemed doubtful whether under conditions of actual speech such an unusual number of tonal species could be certainly distinguished either in hearing or in utterance. But when once the figures were plotted, and it was possible to make definite comparison of them, the doubt was greatly strengthened. Few of these figures show any clear-cut distinction of form. Tone 1, to be sure, with its deep curving drop, and Tone 4 with its single short sharp note, are unmistakable. But the other eight seemed at first a mere huddle of featureless shapes all crowded into the narrow compass of mid-voice pitch. Nowhere among them was there a rising glide or a circumflex or a low-pitched level note—figures of real individuality and character common in tonal languages. Nevertheless, after further study certain marked resemblances between members of this group of eight began to appear, leading to a rearrangement of them in four groups, each group consisting of two obviously similar figures constituting apparently a single species or type. This would be a simplification of the scheme very much to be wished, but before accepting it even tentatively certain matters must be considered.

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[1] For a full account of the method used see this Journal vol. xxxi, pp. 284—286.

1. In all similar studies so far undertaken, the one abiding feature of these "tones" has proved to be the *general* figure or pattern of movement as regards pitch. Considerable differences in detail are freely allowed, and indeed for the most part pass unnoticed, as may be seen in Chart B, where several examples of the same "tone" uttered consecutively by the same person are plotted side by side.

2. The feature least stable is absolute pitch, that is, definite position on the musical scale. Examples of large variation in this feature may be seen in groups IV and VI on Chart A, and under I in Chart B. That this is inevitable becomes plain when we recall that in singing each succeeding note takes its place at a measured interval of pitch from its immediate predecessor, so that each note furnishes a definite cue for the pitch of the next one. In singing, therefore, it is possible for a trained voice guided by a trained ear to approximate that interval so nearly that the ear of the listener is entirely satisfied; though even so it can never be mathematically correct. But in speech there are no measured intervals at all, and no constants of pitch to measure from. In tonal languages no vowel takes its cue of pitch from its neighbor, but only from a general sense of the relation of its "tone" to the general scheme of the voice. Under such conditions it is impossible for the organs of speech to strike accurately and maintain consistently—or for the ear to judge with even approximate accuracy—the definite pitch of any vowel in the flow of words. If proof be needed of this statement, one has only to look at the pairs of duplicates shown on the chart—duplicates which, as has already been said, are remarkable for the accuracy of their reproduction. The words in each case were the same,

and were uttered in close sequence; yet they differ in pitch sometimes as much as three semitones. "Tone" then, in our sense of the word, is not exactly pitch at all, but rather a patterned change or movement within the field of pitch. If the general pattern or figure remain the same, small differences of pitch do not compel the assumption of different species.

3. Vowel-quantity is a thing strictly observed, I believe, in all languages of the Chinese type. If "tone" be a patterned change or movement of pitch, quantity is time elapsed during the movement. Longer time-allowance favors a fuller execution of the pattern. Shorter time compels more or less abridgement. Time—that is quantity—is the horizontal ordinate of the chart, while pitch is the vertical one. Long quantity therefore appears as long reach of the figure across the chart. If a given pattern is found in both long and short forms, the long would naturally be accounted the type or species, since it is the more fully characterized, while the short would be the variety.

Turning now to the chart, we observe that in group II No. 5 is a third longer than No. 2; in group III No. 7 is a third longer than No. 8; in group IV No. 9 is half as long again as No. 10. In all these cases the patterns are strikingly similar, save that No. 9 has made use of its longer time to throw in a preliminary flourish. Unless further investigation should invalidate these results, it would seem that these six "tones" of the Cantonese list should be reduced to three species, each having perhaps a short variety.

The case of group V is not so clear. The resemblance between its members is not so compelling, and the quantity affords no clue. It seems altogether unlikely that within so narrow a compass of pitch two distinct species, each with the same pronounced rising vanish, could be successfully maintained. Determination of the matter can only be accomplished by those who can compare the results of a large series of instrumental records with the reports of a trained ear on the living speech.

4. So far as I know, long quantity "by position" as in Latin and Greek prosody has no place in the Chinese scheme. But in one language of the Chinese type—namely the Siamese—there is the interesting case in which a short vowel followed by either of the nasals, *m*, *n*, or *ng*, in syllabic closure, has its tonal function continued in the nasal, so that its "tone"

invariably has the full pattern of the long vowels.[1] This comes about through the fact that the nasals are vowel-like—if indeed they be not vowels altogether, as some are ready to claim—and sufficiently sonorous to take full intonation. This feature is emphasized by the fact that the only other syllabic closure ever heard in the language is that of the unvoiced stops, *p*, *t*, *k*, and the glottal stop which is not recognized in English. That is, all short vowels in closed syllables are either lengthened by continuation into a nasal, or are abruptly chopped off by the guillotine of an unvoiced stop which is not even exploded. That closure does affect tone is shown not only by the amplification of pattern in the case of the nasals, but by the fact that in the other case the vowels are limited to two special "tones," the one a sharp high-pitched note extremely short (identical with Tone 4 of the Cantonese scheme), and the other a very short variety of the "depressed level tone" of long vowels. All this suggests the need of a careful examination of this field in the Chinese dialects also, if the theory of their "tones" is ever to be placed on a sure basis.

To sum up this part of the discussion—1) In the records of the eight traditional "tones" here in question there seem to be but four real patterns or figures of movement, and this fact strongly suggests the reduction of the eight to four. 2) The slight differences of pitch noted within some of the pairs so grouped offer no valid objection to their association under one species, since the differences are no greater than those often found between consecutive utterances of the very same word. 3) The minor differences of figure or pattern which appear are in some cases fully accounted for by demonstrated difference in vowel-quantity, which, as is well known, does often modify the tonal pattern materially. 4) In other cases the observed facts of a kindred speech suggest an examination of the syllables listed by the natives as of a given "tone" to ascertain whether they are open or closed; and if closed, whether the closure is by sonorous consonants which extend the vowel tone, or by stops which abruptly cut it off.

If this tentative combination and reduction is found to be in accord with the facts, the Cantonese scheme of "tones"

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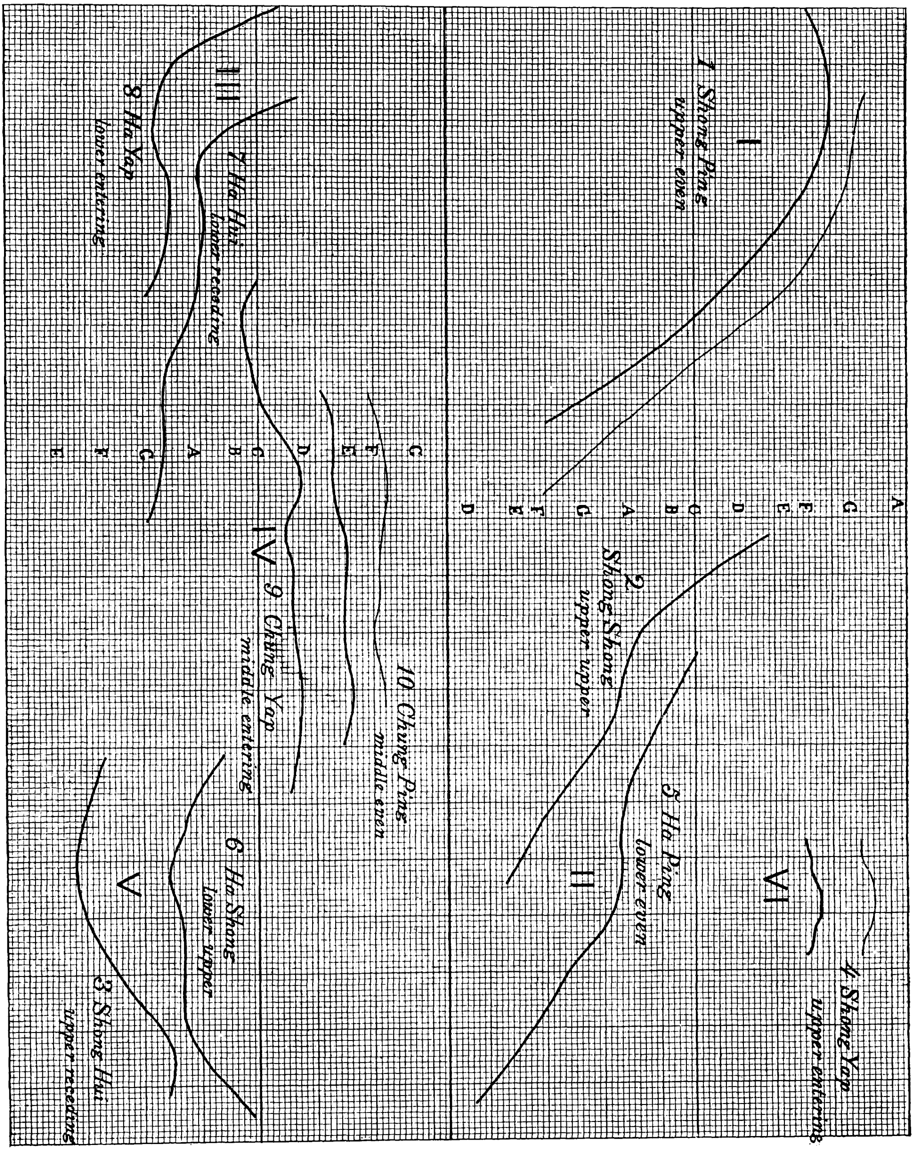
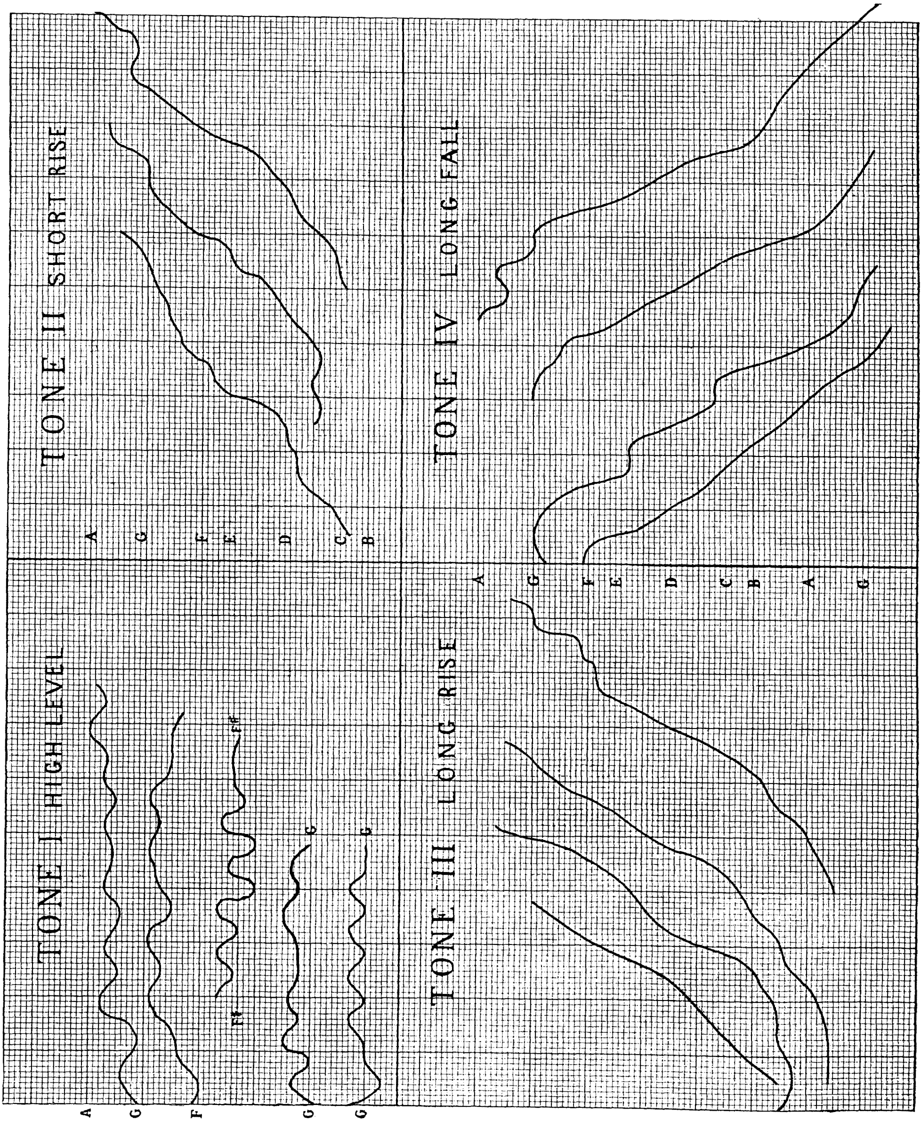
[1] Cf. Journal of the American Oriental Society, vol. xxxi, pp. 287—88.

A–CANTONESE


I
1 Shong Ping
upper even
2
Shong Shong
upper upper
3 Shong Hui
upper receding
4 Shong Yap
upper entering
II
5 Ha Ping
lower even
6 Ha Shong
lower upper
III
7 Ha Hui
lower receding
8 Ha Yap
lower entering
IV
9 Chung Yap
middle entering
10 Chung Ping
middle even
V
VI
A
G
F
E
D
C
B
A
G
F
E
D
G
F
E
D
C
B
A
G
F
E

B—PEKINGESE


TONE I HIGH LEVEL
A
G
F
F♯
F♯
G
G
G
G
TONE II SHORT RISE
A
G
F
E
D
C
B
TONE III LONG RISE
TONE IV LONG FALL
A
G
F
E
D
C
B
A
G

would be brought into workable dimensions, and the "huddle about the mid-voice pitch" would be greatly relieved. But even so it would not entirely amend the lack of bold and unmistakable distinctions in this group of "tones." The approximately level line on IV indeed is ordinarily an unmistakable figure; but here its neighbors on either side are too nearly like it, and too nearly like each other, to make discrimination between the three either very easy or very sure in actual practice. Languages of this type are not only limited to monosyllabic words, but the number of possible monosyllables is in some dialects greatly reduced by allowing very few consonants to take the final place. The result is that there are not monosyllables enough to furnish forth the necessary vocabulary unless difference of tone be added to the possible differences of articulate elements alone. One wonders therefore whether, when they were about it, the founders of the Cantonese dialect failed to develop distinctions which really distinguish, or whether the present situation is the result of a sort of tonal decay which has leveled distinctions that once were valid—distinctions which meticulous Chinese scholarship retains in its scheme, though they now are no longer found in its practice.

I feel sure that the figures on the chart are truthful representations to the eye of the various movements of pitch in the particular words which were spoken into the receiver of the recording instrument. It is possible, of course—though I do not think it actually so in this case—that the speaker's accent was at fault, or that the words he spoke did not properly represent the "tones" indicated. But, barring this possibility, it seems certain that in three, or perhaps four, instances, a given pattern was duplicated under another name. The evidence is there on the chart. A much larger series of records, and records of many different voices, must of course be examined before any general conclusion is reached. But for this voice and for this series of records the following summary and reclassification I think will hold. I offer it only as a starting point for further investigation and comparison by those who are more fully equipped and more fortunately placed for the accomplishment of the task.

The Tone-patterns of Cantonese Speech—Description and Reclassification.

I (Tone 1).—A drop of increasing steepness through more than an octave from a level start at high pitch of voice. Long in quantity.

II (Tones 2 and 5).—A straightaway glide from about mid-voice pitch, dropping gradually through less than an octave. Long, with probably a shorter variety.

III (Tones 7 and 8).—A short drop from about mid-voice pitch, merging some three tones below into a level run. Long, with well marked short variety.

IV (Tones 9 and 10).—A level run at a little above mid-voice pitch. Long, with well-marked short variety. (Identical with the "middle tone" of the Siamese.)

V (Tones 3 and 6).—A preliminary movement of uncertain figure at the depressed level of III, ending with a rising vanish. Possibly meant for the reverse of III.

VI (Tone 4).—A high note, extremely short, in which the vowel tone is abruptly cut off by the closure of an unvoiced stop *not exploded.* (Identical with the "high abrupt" or "high explosive" of the Siamese.)

B—Pekingese.

The speech here recorded and analyzed is that of Mr. K. S. C. Kiang, Assistant in Chinese in the University of California, brought up from infancy in Peking, and resident there nearly all his life. The purity of his accent is vouched for by Professor John Fryer.

In plotting the results on Chart B, no attempt was made —as was done in the other case—to soften or generalize the minute inaccuracies or excentricities of execution which seem to be present in every vocal utterance. These are here retained as illustrating the superior delicacy of instrumental analysis as compared with even the trained ear. To the ear the serpentine wanderings of Tone I are absolutely unheard—are all blended into a single level note; and the three glides of Tones II, III, and IV, give not the slightest hint of uncertainty in attack or of hesitation in movement such as appears in the chart. For all ordinary purposes, however, the generalized form is no doubt preferable as less confusing, and as presenting more clearly the features which are constant. The small number of tonal patterns found in the Pekingese has permitted the plotting of several examples of each which may serve further to illustrate these points.

The chief features of the Pekingese scheme as here shown are: (*a*) its simplicity, due to the fewness of its "tones" and to the remarkable consistency of adherence to type; and (*b*) the high pitch and small compass of voice used in their execution. This last might of course be merely a personal peculiarity of the speaker. But Dr. Fryer is inclined to regard it as a general characteristic of the northern dialect. The only point of doubt which appears is caused by the very close resemblances between Tones II and III, raising the question as to whether they are not really one. This will be considered in the discussion of the individual Tones, to which we now pass.

Tone I is discerned by the ear as a high-pitched level note, near the upper limit of the speaking voice. Instrumental analysis of it, while in general confirming the impression of the ear, discloses a constant wavering or "wobbling" of the voice about a central line of level pitch. This central line seems to be the note which it is intended to strike and hold, but from which in its execution the voice continually sags or wanders, and to which it has to be continually brought back by a series of infinitesimal readjustments in the tension of the vocal chords. As has already been said, the same phenomenon in the form of hesitation and correction, may be traced in nearly all the other lines plotted on this chart.

Tones II and III may be best considered together. They are both rising glides ranging through the greater part of an octave, and reaching the high level of Tone I. Typically, however, III begins at a point about three semitones lower than II, and ranges upward through a whole octave; while II begins at about C, and covers only three-fourths of an octave. III moreover has usually a short preliminary movement before the rise actually begins. This is understood by the ear—if it notes it at all—as a short level run. This preliminary is commonly absent from II, or is much reduced. Yet II sometimes shows it unmistakably, and III sometimes lacks it altogether. Then III typically stretches over a wider horizontal space on the chart, that is, occupies longer time—a natural result of its double movement and of its longer climb. But it is not so in every case. Indeed, were not the word here spoken known to be of Tone III, the example shown on the extreme left of group III would be taken for an unusually perfect specimen of Tone II.

On none of the lines then which we have been considering can groups II and III be really distinguished. The examples might be so arranged as to form a continuous series. According to all scientific canons they should be considered a single species. Should further examination of vocabulary, syllabication, and current usage discover a division along the line of vowel-quantity, the longer form would naturally be considered the type, while the shorter would be the variety.

Tone IV is simply III reversed. It is a long descending glide, beginning near where III ends, and ending near where III begins. The initial uncertainties, moreover, carry a suggestion of a preliminary run, which may or may not be confirmed by further examination.

Note.—A few weeks ago,[1] when these studies were already under way, the writer learned that a Scandinavian scholar whose name could not be recalled had recently published a study of certain of the Chinese "tones." In the troublous days since then the writer has not been able to get track of the paper, nor to secure any further information regarding it. Under the circumstances it was thought best to complete what was begun and let the results take their chance. Being thus independently obtained, and very likely by independent methods and from different material, they should be of some value, if only for corroboration or as a starting point for further investigation.

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[1] The manuscript of this article was submitted in November, 1914. Ed.